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Linda L Welz, Manager, Software Product Assurance Resource Center
Dr. John C. Kelly, Group Leader, Methodology Group, Software Product Assurance Section

Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Dr., Mail Stop 125-233
Pasadena, CA 91109

Phone: 818-354-6681
Fax: 818-393-1362

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Formal Inspection Technology Transfer Program

A Formal Inspection Technology Transfer Program, based on the inspection process developed by Michael Pagan at IBM, has been developed at the Jet Propulsion Laboratory. The goal of this program is to support organizations wishing to use Formal Inspections to improve the quality of software and system level engineering products. The Technology Transfer Program provides start-up materials and assistance to help organization establish their own Formal Inspection program, The course materials and certified instructors associated with the Technology Transfer Program have proven to be effective in classes taught at other NASA centers aswell as at JPL,

Formal Inspections (NASA tailored Fagan Inspections) area set of technical reviews whose objective is to increase quality and reduce the cost of software development by detecting and correcting errors early. A primary feature of inspections is the removal of engineering errors before they amplify into larger and more costly problems down stream in the development process. Note that the word "inspection" is used differently in software than in a manufacturing context. A Formal Inspection is a front-end quality enhancement technique, rather than a task conducted just prior to product shipment for the purpose of sorting out defective systems (manufacturing usage). Formal Inspections are supporting and in agreement with the "total quality" approach being adopted by many NASA centers.

Formal Inspections, a more rigorous and well-defined technique than their predecessor "walkthroughs", are a detailed examination of a product on a step-by-step or line-of-code basis. Inspections are distinguished from software end-of-phase reviewsin that they evaluate smaller work products segments with a smaller group of reviewers (usually 3 to 6 people). Each participant is assigned a specific role (moderator, reader, recorder, author, inspector) withwell-defined activities and responsibilities. Some early engineering products that typically undergo Formal Inspection are requirements, designs, test plans, and code. Inspection teams are composed of peers from development, test, user groups and quality assurance. These team members are selected from engineers having a vested interest in the work product under inspection. Inspections are held several times during the pretest phases of a project. Checklists are used to remind inspectors of common errors made during each phase of the early software lifecycle and provide a criteria to classify defects for subsequent rework, Standard forms are used to record product errors and track metrics associated with the inspection process. The collection and monitoring of metrics is an integral part of Formal Inspections and provides useful insight into the progress of a project.

An established Formal Inspection training and follow-up program has been in place at JPL for five years. Over 350 inspections have been conducted on 11 projects since their introduction, Substantial gains in the quality of early lifecycle products have resulted from inspections. Formal Inspections applied to requirements have uncovered an average of one major error in every three pages. The most common of these errors have been *missing requirements,* which accounted for 67% of the major errors found, Completeness of requirements documents is one of the most significant of many measurable improvements resulting from Formal Inspections. Additional results showed that finding and fixing errors through inspections was significantly less costly than similar rework performed during the test phases. Inspections require an average of 0.7 work hours to fix a defect, compared to a range of 5 to 18 hours to fix a defect during formal testing.

In addition to the training and start-up program, the Formal Inspection Technology Transfer Program can also provide support for 1) awareness activities and materials, 2) data base development for inspection metrics, 3) local inspection program planning, 4) tailoring inspections for local needs, 5) consultation for center head moderator and trainers.

The Formal Inspection effort is carried out by the Jet Propulsion Laboratory, California Institute of Technology, under contract with the National Aeronautics and Space Administration.